

4. A Monograph of the Genus *Paradoxurus*, F. Cuv.

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(Plates XLIX. & L.)

I have recently had occasion to prepare, for a forthcoming work on Indian Mammalia, an account of the species of *Paradoxurus* inhabiting India, Burma, and Ceylon. In the course of my work I have found it necessary to examine in detail the literature relating to the different forms, and I have come to conclusions differing somewhat from those hitherto published on the subject. It may perhaps be of use to those who have occasion to deal with species belonging to the genus, which are by no means easy to determine, if I state the results of my inquiries and extend them to all the species belonging to this generic type.

My work has been principally based on the collection of skins and skulls in the British-Museum collection, in examining which I have received much assistance from Mr. Oldfield Thomas, who had already arranged the specimens to a considerable extent, and to whom I am indebted for much information and for many suggestions.

The latest attempt at an arrangement and definition of the species belonging to the genus and its allies was made, so far as I can ascertain, by the late Dr. J. E. Gray in his revision of the genera and species of Viverrine animals. This appeared in the Proceedings of the Society for 1864, and was republished, with a few additional notes and references, in the 'Catalogue of Carnivorous, Pachydermatous, and Edentate Mammalia in the British Museum' (1869). In the classification there adopted, nine species of *Paradoxurus* are admitted, besides three of *Paguma*, one of *Arctogale*, and one of *Nandinia*. In addition to these eight more "species of this group requiring further examination" are enumerated, and at least three other nominal species are mentioned. So far as I am aware only one species¹, *P. musschenbroeki*, from Celebes, has been described since Dr. Gray's Catalogue appeared; but in that Catalogue some names previously given are omitted², amongst which are *P. nubia*, F. Cuv., *P. rubidus*, Blyth, and *P. tytleri*, Tytler. As will be seen in the sequel, my own conclusions as to the species of the genus differ widely from Dr. Gray's, whose Catalogue contains numerous mistakes of various kinds³.

¹ Except of course *P. jerdoni*, above, p. 613.

² A few names that have, so far as I can find, never been published are added in the synonymy. There may have been a reason, though its nature is not clear, for the insertion of these technically unborn terms, but there is no scientific purpose to be served by repeating them.

³ I will point out two, which are characteristic, and occur in the synonymy of one species, *Paguma grayi*, P. Z. S. 1864, p. 541, and Cat. Carn. &c. Mamm. B. M. 1869, p. 73. The first is the quotation of "*Paradoxurus bondar*, Temminck, Mon. ii. p. 332, t. 55. f. 1-4 (skull, not syn.)," as a synonym of *Paguma grayi*. The late quoted, 55, is a mistake for 65, and figures 1-4 for figures 4-6, as is









Before proceeding to the synonymy of the species, a few words on the history of the genus may be useful.

That no notice of so extremely common and widely distributed an Oriental type as *Paradoxurus* should be found amongst the earlier zoological writers of the 17th and 18th centuries would be very remarkable. It is probable that some of the descriptions given by Sonnerat and others¹ were founded upon species of this genus. The first account, however, that has hitherto been recognized as

evident from the fact that in Gray's 'List of the Specimens of Mammalia in the Collection of the British Museum,' published in 1843, the quotation runs pl. 65. f. 4-6, and these are the figures called *P. bondar* by Temminck. Gray evidently accuses Temminck in 1843, again in 1864, and once more in 1869, of having figured the skull of *P. grayi* by mistake for that of *P. bondar*. Now the two skulls differ much in form, and I can only say that Gray is entirely in error, and that Temminck appears to me quite right. It is true that on the same plate 65 of Temminck's monograph figures 1-3 represent the skull of *P. larvatus*, which is extremely similar to that of *P. grayi*; but these figures 1-3 were quoted by Gray in all the works mentioned under *Paguma larvata*, with the addition in P. Z. S. 1864, p. 540, of t. 55. f. 1-3, which, although copied without alteration in the subsequent B.M. Catalogue of 1869, is, of course, an absurd mistake, as plate 55 in Temminck's monograph contains figures of bats. The description in Temminck's work at p. 332 is also that of *P. bondar* (= *P. niger*), and not of *P. grayi*. The mistake on Gray's part is the more noteworthy, because in P. Z. S. 1864, p. 527 (and in the B.M. Catalogue of 1869), he states that some of Temminck's figures of skulls are wrongly determined, and this figure of *P. bondar* is, so far as I can see, the only case quoted.

The second instance is the quotation, also under *Paguma grayi*, of "*Amblyodon doré*, Jourdan, Ann. Sci. Nat. viii. 276 (1837)." On the next page Gray writes thus:—"The only character that M. Jourdan gives for *Amblyodon* is the following," and a quotation in French of some length follows from the 'Annales des Sciences Naturelles.' It is probable that Gray's knowledge of French did not enable him to thoroughly understand the passage, or he must have suspected a mistake, the fact being that the paper in the 'Annales des Sc. Nat.' is not by M. Jourdan at all, but is a review of M. Jourdan's paper by De Blainville, and extracted from the 'Comptes Rendus.' Had Gray turned to Jourdan's original description in the 'Comptes Rendus,' v. p. 442, he would have found a description at least as good as any of his own, and would probably not have referred the species to *P. grayi*. Judging from the description, De Blainville was perfectly right in identifying it, in his 'Ostéographie,' with *P. leucomystax*.

My reason for quoting these two mistakes is that in each case a charge is brought against another naturalist upon evidence furnished by Dr. Gray's own blunders. To correct Dr. Gray's mistakes in detail would be a Herculean labour, but unfortunately they are constantly leading others astray. Thus, in P. Z. S. 1868, p. 525, the genus *Crocota* is said to be distinguished by having "the hinder legs short." In the 1869 Catalogue, p. 212, *Hyæna* is further characterized as having "legs subequal." Evidently the characters have been transposed, for the hind legs are much shorter in *Hyæna* than in *Crocota*; but in a recent article on the *Fiverridæ* and their allies, wherein Gray's separation of the genera *Crocota* and *Hyæna* is noticed, one of the distinguishing characters of the former genus is said to be that the hind limbs are shorter than the fore limbs.

¹ Schreber and Gmelin, under *Fiverra zeylonensis* (*V. zeylanica*), refer to *Martes philippensis*, Camelli, Phil. Trans. xxv. p. 2204, and Gray also refers to this species under *Paradoxurus zeylanicus*. Camelli merely mentioned a species of Marten, of which he gave an imperfect description, amongst the Mammalia inhabiting the Philippine Islands. The so-called Marten may, however, have been a *Paradoxurus*.

applying to a form of *Paradoxurus* is one by Buffon, who, in the Supplement to his 'Histoire Naturelle,' described an animal that he called "La Genette de France," and evidently believed to be a French species of Genet. As was, however, shown by F. Cuvier¹, the animal described and figured, which was from an unknown locality, and had been purchased in London, was probably an Indian *Paradoxurus*; but even in this case the identification is somewhat doubtful, for there were, according to Buffon, traces of annulations on the tail.

The next notices are in Schreber's 'Säugethiere,' where descriptions by Pallas are given of animals named by the latter naturalist *Viverra hermaphrodita* and *V. zeylonensis*. The following is a translation of the description in German of *V. hermaphrodita*, Schreb. Säugeth. iii. p. 426:—

"The muzzle as far as and above the eyes is black, so are also the long bristles of the beard (*Barte*, which would include the *vibrissæ*) and above the eyes, the ears, the throat throughout its whole breadth, and the feet. In front of the ears the black has a light grey margin. A white spot exists under the eye, and another amongst the *vibrissæ*, almost as in the Genet. The hair is long, grey near the skin, black at the tip, consequently the fur assumes a mixed, but more of a black colour. Over the back run three quite black stripes. The belly is lighter. The tail is longer than the body, black at the end. The nails are yellow.

"Over the penis there extends a longish naked spot as far as the anus. Where this spot begins, the soft white skin makes a double fold with a raised division lying between. This has occasioned the animal to be exhibited to ignorant people as a hermaphrodite."

The description leaves no reasonable doubts that the animal was a *Paradoxurus*. The size is said to have been between that of a Civet Cat and that of a Genet.

The description agrees well with the common *Paradoxurus* of the Malay countries, now generally known as *P. musanga*. The presence of the stripes on the back shows that the animal was in all probability not the Indian form (*P. niger*, v. *typus*). The Malay species has usually a broad white or whitish band across the forehead, instead of merely a "light grey margin"; but this is an extremely variable character. The specimen, it is true, was said to be from Barbary, but no North-African mammal corresponds to the description.

The *Viverra zeylonensis* of Pallas² has also been identified by Gray and others with a species of *Paradoxurus* found in Ceylon, but in this case the identification is very much more doubtful. The Ceylon species is of a uniform dull rufous or ferruginous colour throughout, whilst in Pallas's description the coloration was said to be grey above, overspread with brown, below paler, blackish on the hinder parts of the back and on the tail; and there is nothing by which the animal can be satisfactorily determined. The *vibrissæ*

¹ Hist. Nat. Mamm., notes to pl. 186, *La Martre des Palmiers ou Pougouné*.

² Schreb. Säugeth. iii. p. 451.

are said to have been whitish, which precludes the idea of the specimen having belonged to the common *P. niger*; and although it was probably a *Paradoxurus* that was described, this is far from certain, the presence of a groove beneath the penis being the only indication of generic affinities. Nothing is said of a naked area around the genitals nor of the characters of the feet. It is true that it is difficult to tell what other animal from Ceylon could have been described by Pallas, but a hundred years ago localities were by no means trustworthy, as is shown in the case of *V. hermaphrodita*.

The Musk or Musky Weasel of Pennant's 'History of Quadrupeds' (3rd edition, vol. ii. p. 72, published in 1793) has been referred to a species of *Paradoxurus* by Gray¹, and probably with justice. The description was taken from the drawing of a Bengal animal in the possession of Sir Elijah Impey.

Beyond copies and translations of Pallas's descriptions in the compilations of Zimmermann, Gmelin, Boddaert, and Shaw, I can find nothing further published on the subject until 1820². In that year Desmarest's 'Mammalogie' appeared, with descriptions of *Viverra prehensilis*, p. 208, and *V. bondar*, p. 210, founded by De Blainville on figures in the library of the East-India Company, London. The drawings are fortunately still in existence and are easily recognized; they are amongst a series made for Dr. Buchanan Hamilton by native artists, and have written on them the names *Ichneumon prehensilis* and *Ichneumon bondar*, which were apparently given by Buchanan Hamilton himself. Moreover the Bengali names are written on each drawing in the ordinary cursive Bengali character; and as this character is peculiar to Bengal, it serves to show where the drawings were made, and probably that the animals represented were well known in the country, though but little value can be attached to this evidence. I am indebted to Mr. Long for deciphering the names. The drawing of *Ichneumon bondar*, the Bengali names assigned to which are *bhám* and *bhondar*, represents the common Indian *Paradoxurus* unmistakably. This is important, as will be seen presently, because Jerdon has classed *P. bondar* as distinct. The figure of *Ichneumon prehensilis*, of which the Bengali name is given as *Bághdánkh*, represents, I believe, the striped race or species, which I refer to *P. hermaphroditus*, common in Lower Bengal and at the foot of the Himalayas. The *Paradoxurus prehensilis*, figured in the Society's 'Proceedings' for 1877, pl. lxxi., is, however, I think, a different form, *Arctogale leucotis*.

¹ P. Z. S. 1832, p. 65.

² Dr. Gray, in his 'Catalogue of the Carnivorous, Pachydermatous, and Edentate Mammalia in the British Museum,' p. 77, footnote, states that M. de Blainville saw the drawings collected by Buchanan Hamilton, at the India House, in 1816, and published a paper in the Bull. Soc. Philom. for that year, with descriptions of *Viverra prehensilis* and other species. There is no such paper by De Blainville in the 'Bulletin de la Société Philomathique' for 1816, nor can I find any reference to any such paper amongst the Royal Society's list of De Blainville's contributions to the periodical named and to other journals, whilst Desmarest makes no reference to a previous publication of the name.

It may be here remarked that De Blainville's name *Viverra prehensilis* cannot be applied to any species of *Paradoxurus*, because there is a much earlier use of the same term *Viverra prehensilis* by Kerr in 1792 (An. King. p. 169) for the Kinkajon (*Cercoleptes caudivolvulus*).

A third species in Desmarest's 'Mammalogie' is *Viverra nigra*, p. 208, founded upon skins sent by M. Leschenault de Latour from Pondicherry under the French name of *La Martre des palmiers* or palm-marten. Although the description was supposed by Otto to be that of *Arctictis binturong*, there can be, I think, no question but that the skin described by Desmarest was that of the common Indian *Paradoxurus*.

The generic name *Paradoxurus* was proposed in the succeeding year, 1821, by F. Cuvier in the 'Histoire Naturelle des Mammifères' for an animal living in the Menagerie at Paris, and sent by M. Lechenault¹ from Pondicherry as *La Martre des palmiers*, clearly the same species as that, a skin of which in the previous year had formed the type of Desmarest's *Viverra nigra*. Cuvier proposed a new specific title, *Paradoxurus typus*, for his animal; and as the name was accompanied by a coloured figure, which, although far from a good representation, is fairly recognizable, this name has been more generally used than any of the earlier specific titles. The generic name was founded on the circumstance of the animal carrying its long tail in a coil, a peculiarity that appears to be very common in caged specimens belonging to this genus, but which has never, so far as I can learn, been observed in the wild state. That the coiling is due to a diseased condition is evident from the circumstance that many animals thus affected are unable to uncoil their tails.

In the 'Mémoires du Muséum d'Histoire Naturelle,' vol. ix. p. 41 (1822), F. Cuvier added two additional species, *P. albifrons* and *P. aureus*. The former, from a drawing by Duvancel of an animal in the Menagerie at Barrackpore Park, near Calcutta, was not a *Paradoxurus* at all, but *Arctictis binturong*; the latter was taken from a young animal, preserved in spirit, of unknown origin. As it was coloured of a golden tawny (fauve doré) throughout, the only species to which it can be referred is the Ceylonese animal subsequently called *P. zeylanicus* by Gray.

Long subsequently, in 1839, F. Cuvier, the younger, figured and described in one of the numbers of the 'Histoire Naturelle des Mammifères' a specimen said to have been brought from Nubia by a Mr. Burton, under the name of *Paradoxurus nubiaë*. The figure may have been taken from a typical variety of *P. hermaphroditus*.

Viverra musanga was described by Raffles in 1822, and subsequently referred to *Paradoxurus* in Horsfield's 'Zoological Researches in Java.' Another species, *P. leucopus*, was added by Ogilby, in the 'Zoological Journal' of 1828, vol. iv. p. 304. *Gulo larvatus*, described originally by Hamilton Smith, was made the type of a new genus, *Paguma*, by Gray, in the Society's 'Proceedings,' Part 1

¹ Doubtless the same as is mentioned by Desmarest, though his name is spelt with a slight difference

(1831), and referred by him to *Paradoxurus* in the next volume of the same work.

In the Society's 'Proceedings' for 1832, pp. 65-68, Dr. Gray gave a list¹ of the known species of *Paradoxurus*, and proposed as new *P. pennantii*, *P. dubius*, *P. pallasii*, *P. crossii*, *P. hamiltonii*, *P. trivirgatus*, and *P. finlaysonii*, besides enumerating *P. typus*, *P. bondar*, *P. prehensilis*, *P. musanga*, *P. hermaphroditus*, *P. leucopus*, *P. larvatus*, and *P. binotatus* previously described. He was also inclined to refer to the genus *Viverra malaccensis* of Gmelin (which, however, is a *Viverricula*) and *Paradoxurus aureus* of F. Cuvier.

In Gray and Hardwicke's 'Illustrations of Indian Zoology,' *P. crossii*, *P. pallasii*, *P. prehensilis*, *P. hamiltonii*, *P. larvatus*, *P. bondar*, and *P. pennantii* are figured. The figures are not good, and some of them are very inferior, *P. prehensilis*, *P. bondar*, and *P. pennantii* being founded on drawings alone, as was also *P. finlaysonii*.

In 1837 Gray described six more supposed species of the genus—*P. quinquelineatus*, *P. leucomystax*, *P. musangoides*, *P. derbyanus*, *P. zebra*, and *P. jourdanii*—in Charlesworth's 'Magazine of Natural History,' vol. i. Another name, *P. nigrifrons*, was added by the same author in the 'List of the Specimens of Mammalia in the Collection of the British Museum,' published in 1843.

Otto, in the 'Nova Acta Academiæ Leop.-Car.' for 1835, gave an excellent description and good figures of an animal which he recognized as the *Viverra hermaphrodita* of Pallas, but which he did not identify with Cuvier's genus *Paradoxurus*. He gave an account with illustrations of the genital glands, and proposed a new generic name *Platyschista* and the specific term *pallasii*.

In the same year *Paradoxurus grayi* was described by Bennett in the Proceedings of this Society. In 1836 Hodgson added three more names, *P. hirsutus*, *P. nipalensis*, and *P. lanigerus* (subsequently corrected to *laniger*), in the 'Asiatic Researches,' vol. xix.

In 1837 Jourdan in the 'Comptes Rendus' proposed two new genera under the names of *Hemigalus* (*Hemigale* is preferable) and *Ambliodon* (*Amblyodon*). No Latin specific names were given; the animals were called *Hemigale zébré* and *Ambliodon doré*. An essay by De Blainville on these two forms appeared in the 'Comptes Rendus,' and was copied into the Ann. Sci. Nat. 2me sér. viii. p. 270, and in the table at the end he united *Ambliodon* and *Paradoxurus*, whilst leaving *Hemigale* as a distinct section; both being considered subgenera or sections of *Viverra*. In a subsequent page of the same volume of the 'Comptes Rendus,' Mr. Jourdan briefly described a species of *Paradoxurus* from the Philippines, under the name of *P. philippinensis*. This paper was reviewed by F. Cuvier in the 'Annales des Sciences Naturelles.'

About 1839 there appeared a monograph of the genus by Temminck, in the 'Monographies de Mammalogie,' vol. ii. Temminck admitted seven species, viz. *P. typus*, *P. musanga*, *P. leucomystax*,

¹ This paper was reprinted in the 'Journal of the Asiatic Society of Bengal,' vol. ii. p. 377.

P. larvatus, *P. bondar*, *P. trivirgatus*, and *P. binotatus*, and classed as doubtful *P. leucopus*, *P. philippensis*, and *P. prehensilis*. This monograph is by far the best attempt at reducing to order a very difficult and complicated genus that has appeared. Gray speaks of it (*P. Z. S.* 1864, pp. 527, 534) in severe terms; and there are undoubtedly some mistakes, several of which appear due to information given by Mr. Ogilby having been incorrect or misunderstood. I can only say that Temminck's work appears to me superior in every respect to Dr. Gray's, and that out of the species admitted by the former I find only one, *P. bondar*, that does not appear a fairly distinct form. Temminck considers *P. pallasii*, *P. crossii*, *P. dubius*, and *P. hermaphroditus* of Gray identical with *P. musanga*, *P. pennantii* the same as *P. bondar*, and *P. hamiltonii* identical with *P. binotata*. In all this I agree; but the union of *P. grayi* and *P. laniger* with *P. larvatus*, which Temminck gives on the authority of Ogilby, is not admissible so far as the present evidence goes, although *P. grayi* and *P. larvatus* appear closely allied. *P. laniger* seems totally distinct¹.

Temminck also looked upon the *Ambliodon doré* and the *Paradoxurus philippinensis* of Jourdan as the same. This was, I think, a mistake.

In De Blainville's 'Ostéographie,' under *Viverra*, an account of the osteology of *Paradoxurus typus* (*P. niger*) is given; and in the Atlas two skulls belonging to the restricted genus are figured—one called *P. hermaphroditus* in the text and *P. typus* in the Atlas (probably that of *P. niger*); the other called *P. auratus* and apparently that of Jourdan's *Ambliodon doré*, which in the text is recognized as identical with *P. leucomystax*.

Wagner's Supplement to Schreber's Säugethiere, vol. ii., published in 1841, contains descriptions of the following species considered distinct:—*P. leucopus*, *P. grayi*, *P. nipalensis*, *P. typus*, *P. musanga*, *P. trivirgatus*, *P. leucomystax*, *P. hirsutus*, *P. felinus*, *P. larvatus*, *P. laniger*, *P. annulatus*, and *P. hamiltoni*. Besides these, *P. crossi*, *P. prehensilis*, *P. quinquelineatus*, *P. jourdanii*, *P. derbyanus*, *P. zebra*, and *P. philippensis* are enumerated as imperfectly known. *P. annulatus* is a supposed new species, founded on a young individual with a ringed tail (probably a variety of *Nandinia binotata*) in the Munich Museum, and *P. felinus* is proposed as a preferable name for *P. hermaphroditus*. Wagner's arrangement of the species appears on the whole inferior to Temminck's.

In Schinz's 'Synopsis Mammalium,' vol. i., published in 1844, *P. typus*, *P. musanga*, *P. leucomystax*, *P. larvatus*, *P. bondar*, *P. trivirgatus*, *P. binotatus*, *P. annulatus*, *P. leucopus*, *P. philippensis*, and *P. nipalensis* are included in the genus; and in the Supplement to the second volume *P. quinquelineatus*, *P. musangoides*, and *P. nubia* are added.

A few other species have been described in various works. Amongst

¹ I found some peculiarly coloured specimens of *P. grayi* in the British-Museum collection labelled *P. laniger*. It is possible that Ogilby may have seen these, and have thus been induced to confound the two species.

these were *P. ogilbyi*, locality unknown, in 1849 by Fraser, in his 'Zoologia Typica'; *P. setosus*, from Ceram, by Hombron and Jacquinot, in the 'Voyage au Pôle Sud'; *P. crassiceps*, by Pucheran in 1855; *P. montanus*, Kelaart, by Blyth, in 1851; *P. rubidus*, by Blyth, in 1858; and *P. strictus* and *P. quadriscriptus*, by Hodgson, in 1855.

In Horsfield's 'Catalogue of the Mammalia in the Museum of the East-India Company,' published in 1851, the following species were enumerated:—*Paradoxurus typus*, *P. musanga*, *P. prehensilis*, *P. trivirgatus*, *P. pallasii*, *P. finlaysonii*, *P. leucotis*, *Paguma grayi*, and *P. bondar*. Of these *P. leucotis*, Blyth, was new.

Temminck, in his 'Esquisses Zoologiques sur la Côte de Guinée,' which appeared in 1853, gave a fresh list of the species comprised in this genus. In this list two additional names were added to those previously enumerated as valid in his monograph; these were *P. ogilbyi* and *P. stigmaticus*, the latter described from Borneo in the 'Esquisses.'

Giebel's 'Säugethiere' (1859) contained accounts of nine specific forms: *P. leucopus*, *P. larvatus*, *P. philippensis*, *P. leucomystax*, *P. bondar*, *P. typus*, *P. musanga*, *P. trivirgatus*, and *P. binotatus*. Some caustic remarks, not more severe than the occasion demanded, were added upon the mere nominal species invented by Dr. Gray and others.

In Gray's Monographs of 1864 (P. Z. S.) and 1869 (Cat. Carn. &c. Mamm. B.M.) two additional names are introduced: *P. fasciatus* instead of *P. musanga*, founded, but erroneously, as shown by Alston¹, on Desmarest's *Viverra fasciata*, and *P. macrodus*. *P. fuscus* of Kelaart is also mentioned under *P. zeylanicus*, but no such specific name was used by Kelaart, who only called the form *P. zeylanicus* var. *fuscus*. Some other MS. names are enumerated as synonyms; the only one of any importance is *P. leucocephalus*, Gray, 'Voy. Samarang,' quoted under *P. leucomystax*. I cannot find any notice of the species in the work named.

Blyth's 'Catalogue of the Mammalia in the Museum Asiatic Society' (Calcutta, 1863), contained the following names, with synonymy, of species represented in the collection:—*P. musanga* (inclusive of *P. typus*), *P. zeylanicus*, *P. trivirgatus*, *P. leucotis*, *P. laniger* (?), *P. leucomystax*, *P. grayi*, and *P. rubidus*. In Jerdon's 'Mammals of India' (1867), the only species described are *P. musanga*, *P. grayi*, and *P. bondar*, but Cingalese, Assamese, and Burmese forms are omitted. From Burma Blyth, in the List of Mammals published in 1875, records *P. grayi*, *P. musanga*, *P. trivirgatus*, and *P. leucotis*. The only species included in Mr. Swinhoe's list of the mammals of Southern China (P. Z. S. 1870, p. 630) is *P. larvatus*.

Adding to the above list the few names recently given, we have thus a grand total of no less than forty-nine specific terms given by

¹ P. Z. S. 1879, p. 666.

various writers to forms that are, or have been, recognized as belonging to the genus *Paradoxurus*. Of these no less than sixteen have been invented by Dr. J. E. Gray, and five by Mr. B. H. Hodgson. A considerable proportion of the nominal species have been made upon drawings (some of them very bad, to judge by the copies published) and immature specimens, and it is not always possible to identify such names satisfactorily.

A few of the names enumerated, however, are no longer included in the genus *Paradoxurus*. Besides such instances as *P. albifrons*, of F. Cuvier, a synonym of *Arctictis binturong*, several species formerly included in *Paradoxurus* are now separated by most naturalists. To *Hemigale* (variously spelt *Hemigalus* and *Hemigalea*) belong *P. derbianus*, Gray, and *P. zebra*, Gray, both of which names appear to have been given to the same species, now known by an older specific name, *H. hardwickii*, also bestowed by Dr. Gray. Similarly, *P. binotatus* and *P. hamiltonii*, two more of Dr. Gray's names, are now recognized as identical, and are distinguished as *Nandinia*, the African representative of the Oriental *Paradoxuri*. A third generic type, *Arctogale*, has, like the preceding, been admitted by Flower¹ and Mivart²; and although it is more nearly allied than the other two genera just mentioned to true *Paradoxurus*, the much smaller teeth, the very narrow and peculiarly formed mesopterygoid fossa, and, apparently, the absence of any conspicuous naked space corresponding to the genital glandular area³, show an amount of distinction that may perhaps be accepted as generic. It is true that as regards the teeth and the characters of the mesopterygoid fossa, a decided approach to *Arctogale* is made by the group of *Paradoxuri* distinguished by Gray as *Paguma*⁴, and by Jourdan as *Amblyodon*; but the difference from typical *Paradoxurus* is much smaller. I do not think the matter of much importance; and as the genus *Paradoxurus*, when the nominal species are weeded out, is not so large as to require division, and as all the species are similar in external appearance and habits, it appears to me better to retain this generic group to the extent generally admitted by the naturalists of the present day.

The genus *Arctogale* was proposed in MS. by Peters, and adopted and published by Gray⁵. The type is said to be *Paradoxurus trivirgatus*; but after examining the type of that species, which is in the Leyden Museum, I am disposed to believe that two forms have been confounded under that name. Unfortunately I omitted, when on a visit to Berlin recently, to examine Peters's type; but the specimens described as *A. trivirgata* by Gray in the 'Proceedings' of the Society for 1864, and again in the 'Catalogue of Carnivorous

¹ 'Encyclopædia Britannica,' vol. xv., Art. Mammalia, p. 436.

² P. Z. S. 1882, pp. 163, 169.

³ This was noticed by Dr. Gray, P. Z. S. 1864, p. 543.

⁴ Proposed P. Z. S. 1831, p. 95, for *P. larvata*. The description related chiefly to the dentition. Subsequently, P. Z. S. 1832, p. 65, Dr. Gray stated that this genus was first established on an animal that had not completely shed its milk-teeth, although its true molars were partly developed.

⁵ P. Z. S. 1864, p. 542.

&c. Mammalia,' published in 1869, appear to me to belong to *Paradoxurus stigmaticus* of Temminck; and this I am inclined to agree with Dr. Jentink¹ in considering distinct from the original *Viverra trivirgata* of Reinwardt, and consequently from Dr. Gray's *Paradoxurus trivirgatus*² founded on Reinwardt's specimen. The skulls of the two³ differ considerably, that of *P. stigmaticus* being much longer in proportion, with the palate further produced backwards, and much narrower behind the postorbital processes. Some other differences have been pointed out by Dr. Jentink.

But amongst the skins in the British Museum is the type of *Paradoxurus leucotis*, Blyth, originally described by Horsfield⁴, and subsequently by Blyth⁵, whose descriptions agree perfectly well. This skin appears to me to be a pale variety of Temminck's *P. stigmaticus*, and, if so, Blyth's name, which has priority by two years, must be retained for the species.

The skull and mandible figured by Dr. Mivart (P. Z. S. 1882, p. 165, fig. 9) are those of *Arctogale leucotis*⁶. The following is the principal synonymy of the two forms referred to *Arctogale*:—

1. ARCTOGALE TRIVIRGATA.

Viverra trivirgata, Reinw. MS.

Paradoxurus trivirgatus, Gray, P. Z. S. 1832, p. 68; Temm. Mon. Mam. ii. p. 333, pl. 63. f. 1; Müller, Zoogd. Ind. Arch. p. 55; Wagner, Schreb. Säugeth. ii. p. 346, *partim*; Schinz, Syn. Mamm. i. p. 385, *partim*; Horsfield, Cat. Mam. Mus. E. I. Co. p. 64, *partim*; Giebel, Säugeth. p. 801, *partim*; Jentink, Notes Leyd. Mus. vii. p. 35.

Length of skull from occipital condyles to alveolar margin of premaxillary bones 3·8 inches, palate length 2·1, breadth at junction of upper sectorials with first true molars 1, breadth of brain-case behind postorbital processes 0·75.

Hab. Java only.

2. ARCTOGALE LEUCOTIS.

Paradoxurus leucotis, Blyth, Horsfield, Cat. Mus. E. I. Co. p. 66 (1851); id. J. A. S. B. xxvii. p. 274; id. Cat. Mamm. Mus. A. S. p. 48; id. Cat. Mam. Birds Burma, p. 26; Gray, P. Z. S. 1864, p. 544; id. Cat. Carn. &c. Mamm. B. M. 1869, p. 76.

Paradoxurus stigmaticus, Temm. Esquisses Zool. p. 121 (1853);

¹ Notes Leyd. Mus. vii. p. 35.

² P. Z. S. 1832, p. 68.

³ It should, however, be stated that in neither of the actual type specimens is the skull preserved.

⁴ Cat. Mamm. Mus. E. I. Co. p. 66.

⁵ J. A. S. B. xxvii. p. 274.

⁶ The woodcut of *Arctogale*, P. Z. S. 1882, p. 164, f. 8, is not a good representation of the animal. The feet are much too heavy, the head too large, and the coloration at all events not typical. A far better figure will be found in the coloured plate, P. Z. S. 1877, p. 681, pl. lxxi., entitled *Paradoxurus prehensilis*. This appears to me to represent *P. leucotis* of Blyth, the light-coloured variety of *A. stigmatica*. The skin and skull of the animal there figured are now, I believe, in the British Museum, where I have examined them.

Gray, P. Z. S. 1864, p. 543; id. Cat. Carn. &c. Mam. B. M. 1869, p. 76; Jentink, Notes Leyd. Mus. vii. p. 35.

Paguma trivirgata, Gray, List Sp. Mam. B. M. 1843, p. 55; Cantor, J. A. S. B. xv. p. 201 (nec *Viverra trivirgata*, Reinw.).

Paradoxurus trivirgatus, Horsf. Cat. Mam. Mus. E. I. Co. p. 64, *partim*; Blyth, Cat. Mam. Mus. A. S. p. 47; id. Cat. Mam. Birds Burma, p. 26 (nec *P. trivirgatus*, Gray, 1832).

Arctogale trivirgata, Gray, P. Z. S. 1864, p. 543; id. Cat. Carn. &c. Mam. B. M. 1869, p. 75; Mivart, P. Z. S. 1882, p. 163, figs. 8 and 9.

Paradoxurus prehensilis, Selater, P. Z. S. 1877, p. 681, pl. lxxi. (nec *Viverra prehensilis*, Blainv.).

Length of skull 4·15 inches, zygomatic breadth 2·4, palate, length 2·3, breadth 1, breadth of brain-case behind postorbital processes 0·5.

Hab. The Malay peninsula and Burma, as far north as Arakan; Sumatra, and Borneo.

There is in the British-Museum collection a Bornean skull that appears to differ sufficiently from those of both *A. trivirgata* and *A. leucotis* to render the existence of a third species probable.

After deducting the specific names above mentioned and restricting the genus, there remain, so far as I am aware, *forty* specific names to be assigned to the different distinguishable forms recognizable as pertaining to *Paradoxurus*. These forms appear to me to be eleven in number, but as there are several described types I have not been able to compare, I may have to correct this estimate. I have, however, been able to examine the majority of the types named by Dr. Gray, and all of Mr. Hodgson's.

Of these eleven specific forms two are very imperfectly known—one, *P. laniger*, being founded upon a skin only, the other, *P. macrodus*, upon a skull alone; but both these appear perfectly distinct from all others. Of the remaining nine, three, viz. *P. larvatus*, *P. grayi*, and *P. leucomystax*, form a very natural group, the genus *Paguma* of Gray¹, distinguished by the characters of the skull, the most important of which is the much greater production of the bony palate. The teeth, too, are somewhat smaller, the brain-case much less constricted behind the postorbital processes, and the frontal region more rounded.

P. musschenbroeki differs greatly from all other species in its annulated tail. The skull is intermediate in form between the last-mentioned little group (*Paguma*) and typical *Paradoxuri*, but rather nearer to the former. The shape of the palate is peculiar.

The remaining five species are very closely allied, and *P. macrodus*, so far as cranial characters go, is connected with them. Three of these forms, *P. niger*, *P. hermaphroditus*, and *P. philippensis*, are so nearly related, and have such distinctly intermediate links, that it is a question whether they should be considered species or geographical races. The other two are well distinguished by external or

¹ In his latest writings at least; formerly he included other species.

cranial characters. The following is a key to the species here admitted¹:—

- A. The tail considerably more than half the length of the head and body together (usually three quarters or more); teeth of moderate size.
 - a. Tail not ringed.
 - a. The bony palate extends less than $\frac{1}{4}$ inch behind the posterior molars. Vibrissæ in general dark-coloured.
 - a'. Colour fulvous, ashy, or black.
 - a". Back unstriped, no pale band across forehead; inner or proximal side of upper sectorial concave 1. *P. niger*.
 - b". Back generally striped, a pale band across forehead; inner side of upper sectorial straight 2. *P. hermaphroditus*.
 - b'. Colour dark brown.
 - a". Fur glossy with black tips. Anterior palatine foramina only extending back as far as canines 3. *P. philippinensis*.
 - b". Fur grizzled, not glossy, with brown tips. Anterior palatine foramina extending to opposite anterior premolars 5. *P. jerdoni*.
 - c'. Colour dull rusty red throughout 6. *P. aureus*.
 - b. The bony palate extends more than $\frac{1}{4}$ inch behind the posterior molars. Vibrissæ, in part at least, conspicuously white.
 - a'. Colour grey or fulvous, head markings indistinct. Skull $4\frac{1}{2}$ to $4\frac{3}{4}$ inches long .. 7. *P. grayi*.
 - b'. Colour generally greyish brown; head-markings black and white, distinct; a broad white band down the forehead and nose. Skull about 4 inches long 8. *P. larvatus*.
 - c'. Colour brown or rufous; head-markings generally distinct, brown and whitish; a broad pale band across forehead, or whole face whitish. Skull about 5 inches long ... 9. *P. leucomystax*.
 - β. Tail ringed.
 - a. Colour above brownish red, with white hairs intermixed 10. *P. musschenbroeki*.
- B. Teeth very large.
 - a. Only skull known; upper sectorial 0·42 inch long 4. *P. macrodus*.
- C. Tail about half the length of the head and body.
 - Skull not known 11. *P. laniger*.

Of the species belonging to allied genera, *Hemigale hardwickii* has broad transverse coloured bands on the back. *Nandinia binotata* may be recognized by its back and sides being spotted with large dark spots, by a pale spot on each side of the withers, and a sub-annulate tail; *Arctogale trivirgata* and *A. leucotis* by having three

¹ This key will, in most cases, serve to identify specimens of *Paradoxurus*, but, I fear, not always by means of the external characters. I have, since this paper was in type seen three specimens of *P. hermaphroditus*, obtained by Dr. J. Anderson in the Mergui Archipelago, Tenasserim. One of these is uniformly dark brown, almost black, and resembles in colour some forms of *Arctogale leucotis*, having none of the markings of *P. hermaphroditus*. The other two are dark brown, with the vibrissæ in part white, and are externally only distinguishable by size from *P. leucomystax*. The skull, however, in each case is unmistakably that of *P. hermaphroditus*.

dark stripes on the back (these are in a very few cases wanting), and by the black or ashy colour of the head unbroken, except sometimes in the latter by a small white spot on the forehead or a narrow white streak down the nose. The small teeth and apparently the absence of a naked space around the preanal glands are also characteristic of the latter genus.

1. PARADOXURUS NIGER.

Musk or *Musky Weasel*, Pennant, Hist. Quad. ed. 3, ii. p. 72 (1793).

Viverra nigra, Desm. Mam. p. 208 (1820).

V. bondar, de Blainv., Desm. ib. p. 210.

Martre des palmiers ou *pougouné* (*Paradoxurus typus*), F. Cuv. Hist. Nat. Mam. pl. 186 (1821); Desm. Mam. Supp. p. 540.

Paradoxurus leucopus, Ogilby, Zool. Journ. iv. p. 304 (1828); Gray, P. Z. S. 1832, p. 67; Temm. Mon. Mam. ii. p. 338; Wagner, Schreb. Säugeth. Suppl. ii. p. 339; Schinz, Syn. Mam. i. p. 386; Giebel, Säugeth. p. 798.

P. typus, Fischer, Syn. Mam. p. 158 (1829); Sykes, P. Z. S. 1831, p. 102; Gray, P. Z. S. 1832, p. 65; List Sp. Mam. B. M. 1843, p. 56; Temm. Mon. Mam. ii. p. 315; Elliot, Madr. Jour. Lit. Sci. x. p. 103 (1839); Wagner, Schreb. Säugeth. Suppl. ii. p. 342 (1841); Schinz, Syn. Mam. i. p. 381; Horsfield, Cat. Mam. Mus. E. I. C. p. 60 (1851); De Blainv. Ostéographie, *Viverra*, p. 17, Atlas, pl. vii.; Kelaart, Prodr. Faun. Zeyl. p. 38 (1852); Giebel, Säugeth. p. 800 (1859).

? *P. pennantii*, Gray, P. Z. S. 1832, p. 66; Illustr. Ind. Zool. ii. pl. 13.

P. bondar, Gray, P. Z. S. 1832, p. 66; Illustr. Ind. Zool. ii. pl. 12; List Sp. Mam. B. M. 1843, p. 56; Cat. Hodgson's Coll. B. M. p. 10 (1846); id. ibid. ed. 2, p. 5 (1863); P. Z. S. 1864, p. 531; Cat. Carn. &c. Mam. B. M. 1869, p. 63; Temm. Mon. Mam. ii. p. 332, pl. 65. f. 4, 5, 6; Schinz, Syn. Mam. i. p. 384; Giebel, Säugeth. p. 799; Jerdon, Mam. Ind. p. 128.

Platyschista pallasii, Otto, Nov. Act. Leop.-Car. xvii. p. 1089, pls. lxxii., lxxiii. (1835).

Paradoxurus hirsutus, Hodgs. As. Res. xix. p. 72 (1836); J. A. S. B. x. p. 909; Calc. Journ. N. H. iv. p. 287; Wagner, Schreb. Säugeth. Suppl. ii. p. 348.

Paguma bondar, Horsf. Cat. Mam. Mus. E. I. C. p. 68 (1851).

Viverra (*Paradox.*) *hermaphrodita*, De Blainv. Ostéographie, *Viverra*, p. 96 (nec Pallas).

P. hermaphroditus, Gray, P. Z. S. 1864, p. 532; Cat. Carn. &c. Mam. B. M. 1869, p. 65 (nec *Viverra hermaphrodita*, Pallas).

P. musanga, Blyth, Cat. Mam. Mus. A. S. p. 46, *partim*; Jerdon, Mam. Ind. p. 125, *partim*, nec *V. musanga*, Raffles.

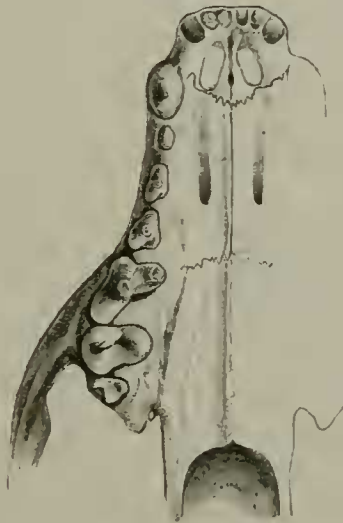
Tail nearly or quite as long as the head and body. Fur coarse and often long, some piles, especially on the back, long and ragged; underfur short or wanting.

In the skull the bony palate extends but little (not more usually than about one eighth of an inch) behind a line drawn through the

hinder edge of the posterior molars. Muzzle generally produced and narrow, but varying in length. Upper sectorial tooth narrow, the inner lobe small and at the distal extremity of the tooth, so that the greatest breadth, at right angles to the outer margin, is at that extremity. This breadth is about two thirds the length of the tooth measured along the outer margin. The inner margin of the tooth between the inner and hinder lobe distinctly concave.

Colour blackish grey to brownish grey. The fur in general long, and with long ragged coarse black tips, but these are naturally much more developed in the cold season. Underfur, when present, ashy

Fig. 1.



Half palate and dentition of *P. niger*. (Specimen no. Brit. Mus. 46.11.9.9.)

or brownish; the longer hairs, beyond the underfur, pale grey with long black tips. As a rule there are no stripes on the back, but indistinct dark bands and rows of spots are sometimes found, especially in young specimens. Feet and the greater part of the legs, with the terminal portion of the tail, frequently one half or more, quite black. The tip of the tail in some individuals is white. The head-markings are variable, the face is generally black or blackish, with a distinct white or grey spot below each eye; another, generally to be detected, on each side of the nose, amongst the vibrissæ, and very often another above the eye. There is not, however, in this form, as usually in the next, a distinct whitish band across the forehead. Vibrissæ black; occasionally, but rarely, a few of the lower are whitish or white towards the base.

Dimensions. Head and body of a male $22\frac{1}{2}$ inches long, tail $19\frac{1}{2}$; of a female $17\frac{7}{10}$ and 18 (*Elliot*). Hodgson gives similar measurements, except that in the female the head and body measured 20, tail $17\frac{1}{2}$. The skull is about $4\frac{1}{4}$ to $4\frac{1}{2}$ inches long.

Distribution. This form of *Paradoxurus* is peculiar to the

peninsula of India and Ceylon. It ranges through all those parts of India that are well wooded, and is found equally about human habitations and in wild forest.

The question of nomenclature and the distinction between this and the next species will be discussed under the latter.

Synonymy. The origin of the names *Viverra nigra*, *V. bondar*, and *Paradoxurus typus* has already been mentioned. *P. leucopus* of Ogilby has been classed as distinct by several writers; and by Gray (P. Z. S. 1864, p. 542) it is said to be probably a variety of *P. grayi*. The vibrissæ are, however, described as black, whilst in *P. grayi* they are always white. The species was of peculiar coloration, with a band round the loins, the feet, and the tip of the tail pure white. But pied or piebald specimens are not of infrequent occurrence in the present species: they are mentioned by Blyth, Jerdon, and Tickell, and as the remainder of Ogilby's description, and especially the presence of long coarse hairs tipped with black on the head, neck, shoulders, rump, and tail, agree with *P. niger*, there can be no hesitation in classing *P. leucopus* as a partially albino individual of that species.

P. pennantii was named from a drawing in General Hardwicke's collection, said to have been taken from an animal found in the Upper Provinces of Bengal, where *P. niger* is the only species found.

The figure of *Platyschista pallasii* resembles *P. niger* in coloration and in the want of any distinct pale frontal band. The back was said to be banded, but the banding represented in the figure is very ill-marked and indefinite.

The identity of Hodgson's *P. hirsutus* with *P. bondar* has been generally accepted. The only difference between the northern race (*P. bondar* v. *hirsutus*) and the southern (*P. niger* v. *typus* = *hermaphroditus* apud Gray), so far as I can see, is that the latter is more ashy and blacker, the former browner in colour. The reason why Blyth and Jerdon, to whose opinions I should attach great weight, have classed *P. bondar* as distinct whilst uniting *P. niger* and *P. hermaphroditus*, was, I believe, that neither of these naturalists had ever seen any of the specimens called *P. bondar* or *P. hirsutus* by Gray, Hodgson, and others. Jerdon's description of *P. bondar* is evidently copied from Hodgson's account of *P. hirsutus*.

2. PARADOXURUS HERMAPHRODITUS.

? *La Genette de France*, Buff. Hist. Nat. Supp. iii. p. 237, pl. 47 (1776).

Viverra hermaphrodita, Pall. Schreb. Säugeth. iii. p. 426 (1778); Zimm. Geol. Gesch. ii. p. 285; Bodd. Eleuch. An. p. 82; Gmel. Syst. Nat. i. p. 90; Shaw, Gen. Zool. i. pt. 2, p. 400.

V. prehensilis, Blainv., Desm. Mam. p. 208 (1820); nec *V. prehensilis*, Kerr, An. King. p. 169 (1792).

V. musanga, Raffles, Trans. Linn. Soc. xiii. p. 252 (1820); Desm. Mam. Suppl. p. 539.

V. musanga, var. *javanica*, Horsfield, Zool. Res. Java, pl. (1824).

Paradoxurus typus, β . *sumatranus*, Fischer, Syn. Mam. p. 159 (1829).

Paradoxurus prehensilis, Gray, P. Z. S. 1832, p. 66; Ill. Ind. Zool. ii. pl. 9; Bennett, P. Z. S. 1834, p. 33; Temm. Mon. Mam. ii. p. 340; Wagner, Schreb. Säugeth. ii. p. 354; Horsf. Cat. Mam. Mus. E. I. C. p. 63; Gray, P. Z. S. 1864, p. 545; Cat. Carn. &c. Mam. B. M. 1869, p. 77.

P. musanga, Gray, P. Z. S. 1832, p. 66; List Sp. Mam. B. M. 1843, p. 56; Cantor, J. A. S. B. xv. p. 201; Temm. Mon. Mam. ii. p. 317, pl. 64, f. 1-3; Müller, Zoogd. Ind. Arch. p. 54; Wagner, Schreb. Säugeth. Supp. ii. p. 344; Schinz. Syn. Mam. i. p. 382 (1844); Horsf. Cat. Mam. Mus. E. I. C. p. 62 (1851); Giebel, Säugeth. p. 800; Blyth, Cat. Mam. Mus. A. S. p. 46, *partim*; Cat. Mam. Birds Burma, p. 26; Jerdon, Mam. Ind. p. 125, *partim*.

P. dubius, Gray, P. Z. S. 1832, p. 66; List Sp. Mam. B. M. 1843, p. 56; P. Z. S. 1864, p. 537; Cat. Carn. &c. Mam. B. M. 1869, p. 69.

Paradoxurus hermaphroditus, Gray, P. Z. S. 1832, p. 67; 1858, p. 113.

P. pallasii, Gray, P. Z. S. 1832, p. 67; Illustrations Ind. Zool. ii. pl. 8; List Sp. Mam. B. M. 1843, p. 55; P. Z. S. 1861, p. 136; Horsf. Cat. Mam. Mus. E. I. C. p. 65 (1851).

P. crossii, Gray, P. Z. S. 1832, p. 67; Illust. Ind. Zool. ii. pl. 7; Wagner, Schreb. Säugeth. Supp. ii. p. 354; P. Z. S. 1864, p. 533, with figure of skull; Cat. Carn. &c. Mam. 1869, p. 66.

P. finlaysonii, Gray, P. Z. S. 1832, p. 68, 1864, p. 545; Horsf. Cat. Mam. Mus. E. I. C. p. 65 (1851).

P. quinquelineatus, Gray, Charlesworth's Mag. Nat. Hist. i. p. 579 (1837); Wagner, Schreb. Säugeth. Supp. ii. p. 355; Schinz, Syn. Mam. ii. Supp. p. 40; P. Z. S. 1864, p. 537; Cat. Carn. &c. Mam. B. M. 1869, p. 69.

P. musungoides, Gray, *ibidem*, Schinz, *ib.*

? *P. nubiae*, F. Cuv. fil. Hist. Nat. des Mam. pl. 187 (1839); Schinz, Supp. p. 41.

Paradoxurus felinus, Wagner, Schreb. Säugeth. Supp. ii. p. 349 (1841).

Paguma crossii, Gray, List Sp. Mam. B. M. 1843, p. 54.

Paradoxurus nigrifrons, Gray, List Sp. Mam. B. M. 1843, p. 55 (*nomen nudum*); P. Z. S. 1864, p. 535; Cat. Carn. &c. Mam. B. M. 1869, p. 68.

P. setosus, Hombr. & Jacq. Voy. au Pôle Sud, Zool. iii. p. 25, Atlas, pl. 6.

P. strictus, Hodgs. Ann. Mag. N. H. ser. 2, xvi. p. 105; P. Z. S. 1856, p. 396, pl. xlvii.; Gray, P. Z. S. 1864, p. 544; Cat. Carn. &c. Mam. B. M. 1869, p. 76.

P. quadriscriptus, Hodgs. Ann. Mag. N. H. ser. 2, xvi. p. 106; P. Z. S. 1856, p. 396, pl. xlviii.; Gray, P. Z. S. 1853, p. 191; 1864, p. 544; Cat. Hodgson's Coll. B. M. 2nd ed. 1863, p. 5; Cat. Carn. &c. Mam. B. M. p. 76.

? *P. crassiceps*, Pucheran, Rev. et Mag. Zool. vii. p. 393 (1855).

P. fasciatus, Gray, P. Z. S. 1864, p. 536; Cat. Carn. &c. Mam. B. M. 1869, p. 68, nec *Viverra fasciata*, Desm.

Tail more than three quarters the length of the head and body,

sometimes quite as long or a little longer. Fur of moderate length in general, not so long and ragged as in *P. niger*.

In the skull the bony palate not produced behind. Muzzle decidedly shorter than it usually is in *P. niger*, and zygomatic arches as a rule stronger. Upper sectorial and molars larger, the former with a much larger internal lobe, and with the inner margin (from the inner to the hinder lobe) nearly or quite straight.

Fig. 2.



Half palate and dentition of *P. hermaphroditus*. (Spec. no. B.M. 81.12.23.)

Colour brownish grey, occasionally ashy. Underfur, when present, brownish, the longer hairs light brown or grey, with occasionally black tips, but these are not as a rule greatly developed, though some Bornean specimens have long sooty-brown terminations. The back is generally more or less distinctly striped with black longitudinally, the number of stripes varying, and the lateral bands being often replaced by rows of spots. The feet, the greater part of the legs, and the terminal portion of the tail black, the tip of the latter occasionally white. Usually there is a distinct broad whitish or grey band across the forehead and in front of the ears, and this band is not divided by longitudinal black streaks, though occasionally there is one in the middle, and others running upwards from the eyes. The muzzle in front of and including the eyes, the top of the head, ears, and sides of neck are dark brown or sooty black, but generally a whitish spot can be detected below the eye, and this sometimes is joined to the frontal band. The markings are very variable, and occasionally either the dorsal stripes, or the pale frontal band, or both are scarcely perceptible¹. Vibrissæ black, the lowest occasionally white near the base.

¹ A remarkable variety from Mergui entirely destitute of markings is noticed in a note to p. 791.

Dimensions. Nearly the same as those of *P. niger*. Cantor says in the largest specimen he measured the head and body together were $24\frac{1}{2}$ inches long. In another the head and body $20\frac{1}{2}$, tail $16\frac{1}{2}$. In a Tenasserim specimen measured by Tickell the head and body measured $20\frac{1}{2}$ inches, tail $20\frac{3}{4}$. Horsfield gives 22 and 18. All the above measurements were, I believe, made on fresh specimens.

Distribution. *P. hermaphroditus* ranges throughout the countries east of the Bay of Bengal—Burma, Siam, Malay peninsula, &c. It is found also in Sumatra, Java, Borneo, and some of the smaller Indo-Malay islands, extending to Ceram and even the Ké Islands (P. Z. S. 1858, p. 113), but perhaps introduced. In Lower Bengal and at the foot of the Himalayas, in Nepal and Sikhim, some of the *Paradoxuri* appear to belong to this species, or to be intermediate between it and *P. niger*.

Before proceeding to discuss the synonymy it is necessary to deal with the differences between this and the last species. Although the two have been classed apart by a great majority of naturalists, by all in fact except Blyth and Jerdon, it is, I think, quite as much a question of convenience as of facts whether the Indian and Malay types of the common *Paradoxurus* should be considered species or subspecies, that is geographical races. Both are variable, but the vast majority of specimens are readily distinguished by some or all of the following characters:—

1. The back is usually striped in *P. hermaphroditus*, unstriped in *P. niger*.
2. There is generally a distinct grey or whitish transverse frontal band in *P. hermaphroditus*, not in *P. niger*.
3. The fur in *P. niger* is usually longer, more ragged, and provided on the upper parts with long black tips, which are wanting in *P. hermaphroditus*; in the latter the fur is generally of more even length.
4. The inner lobe of the upper sectorial tooth is much larger in *P. hermaphroditus*, so that the breadth of the tooth at right angles to the outer margin is about $\frac{8}{10}$ the length of that margin, whilst in *P. niger* the proportion is $\frac{7}{10}$ ¹. The inner lobe is, as a rule, not quite at the distal extremity of the tooth in the former, and the inner margin from the inner lobe to the hinder extremity is straight; in *P. niger* the inner lobe is quite at the distal extremity, and the inner margin concave.
5. The muzzle is shorter in *P. hermaphroditus* than in *P. niger*.

There is, however, variation in all these characters—not one can be said to be constant. So far as I have seen, the shape of the upper sectorial is on the whole the best character, but even here I can find, in the large collection of skulls in the British Museum, a complete or nearly complete passage from one form to the other. But I believe the difficulty chiefly arises from the circumstance that whereas the animals inhabiting the peninsula of India (from the Himalayas to Cape Comorin) and Ceylon differ but little from each

¹ Mean of two measurements of *P. hermaphroditus* and four of *P. niger*.

other, and have in common the characters above noted as characteristic of *P. niger*; and whilst Burmese, Siamese, and Malay individuals have, with few exceptions, the coloration and dentition of *P. hermaphroditus* (*P. musanga*), intermediate varieties are found in Bengal and the countries about the head of the Bay of Bengal. Similarly the variety found in Borneo, and which is represented by several skins in the British Museum, may very possibly be a hybrid or an intermediate form between *P. hermaphroditus* and *P. philippensis*. Under these circumstances it is, I think, a mere matter of convenience whether the two forms are to be distinguished, as I have done, as *P. niger* and *P. hermaphroditus*, whether they are to be called two geographical races or subspecies, or whether, according to the system now in favour with some naturalists, they are to receive trinomial designations, e. g. *P. hermaphroditus niger* and *P. hermaphroditus musanga*¹.

Synonymy. The first question here is the propriety of giving to this species or race the name *hermaphroditus* rather than to the Indian form, to which the name has been assigned by Gray and others.

The reasons for using the name *hermaphroditus* for the present species are two in number. (1) *Viverra hermaphrodita* was described as having three black stripes on the back. The presence of distinct longitudinal bands is the rule in the Malay form, whilst it is exceptional in the Indian. The light grey margin in front of the ears, too, noticed in Pallas's description, agrees better with the grey frontal band of the Eastern type. (2) We may regard *hermaphroditus* as a name applicable to either form, and therefore as including both. In this case, by the Linnæan rule for genera, the name is retained for that portion of the original species which remains after a defined section has been separated. The first section thus separated from *P. hermaphroditus* received the specific name of *niger*, and consisted of the Indian form, so *hermaphroditus* should be confined to the Malayan type. Another circumstance in favour of applying Pallas's name to the latter is the greater probability of a specimen in a German collection of the last century having been derived from Java or one of the Malay islands.

Several of the synonyms given above may possibly belong to *P. niger*, or to some of the intermediate varieties. The rule adopted has been to class all distinctly striped forms and all with a well-marked frontal band under *P. hermaphroditus*.

The figure representing the type of *Viverra prehensilis* is distinctly striped, and is therefore referred here. The tail-tip is white. About *V. musanga*, the Sumatran form described by Raffles, there can be no question. *P. dubius* was founded on the skin of a Javanese animal, not half grown, because it did not agree with the young of *P. musanga*. Both, however, were described (Gray, P. Z. S. 1832,

¹ Personally I think this plan has but little to recommend it, and that it must lead to confusion, because it makes no distinction between geographical races and ordinary varieties, to say nothing of mutations or what may be termed geological varieties, although all these forms of variation are perfectly distinct

p. 66) as ash-coloured (one pale ash, the other *fluvescenti-cinereus*), with three dark dorsal bands and spots on the sides; and it is not clear what the supposed specific distinctions were. The type is in the British Museum, and presents no peculiarity.

P. pallasii was founded on a skin now in the British Museum, and showing the whitish frontal band distinctly, but in other characters approximating to *P. niger*, there being no stripes on the back, where the fur has long black tips. There is no skull, so the characters of the teeth cannot be examined. The figure in Gray and Hardwicke's Illustrations, if taken from this specimen, is very incorrectly coloured, the markings being much exaggerated. The circumstance that Gray (P. Z. S. 1861, p. 136) identified two Cambodian skins with *P. pallasii* is in favour of the name being considered a synonym of *P. hermaphroditus*.

The type of *P. crossii* was a specimen kept in confinement; the characters of the fur are consequently not to be depended upon; the upper sectorial tooth in the skull figured¹ is broader than it usually is even in *P. hermaphroditus*, and quite unlike that of *P. niger*.

P. finlaysonii was founded on "a rough sketch brought by Mr. Finlayson from Siam"! From the description the animal represented was probably a typical example of *P. hermaphroditus*.

"*P. quinquelineatus* and *P. musangoides*, Gray, are perhaps only varieties of the young animal of this species (*P. fasciatus*=*musanga*)."² Except that I should substitute a stronger term than "perhaps," I have for once the satisfaction of concurring in Dr. Gray's opinion. Nothing is known of the types of these supposed species.

Of *P. nubice* I hope to obtain further information. There is nothing in the figure or description to show that the animal differs from *P. hermaphroditus*; but the locality was given as Nubia apparently on trustworthy evidence, the animal having been brought alive to Paris by a Mr. Burton of Bordeaux. Wagner's name *P. felinus* was, as already remarked, merely substituted for *hermaphroditus*.

Of Gray's *Paradoxurus nigrifrons*, the description of which only appeared in 1864, its author admits that the skull is very much like that of *P. crossii*³, and on the next page that "the nature and colour of the fur" are very similar in both; but *P. nigrifrons* "is rather darker in every part, and the crown and cheeks are reddish black, being in *P. crossii* grey or whitish." Both specimens, it should be remembered, had been kept in confinement.

Hombron and Jacquinot described *P. setosus* from a young specimen obtained at the island of Ceram. The skull is figured, and shows the milk-teeth. There is nothing in the description or figure to justify the separation of the form.

The type of *P. strictus*, Hodgson, is a skin with short fur; the dorsal stripes and rows of spots are unusually distinct and numerous.

¹ P. Z. S. 1864, p. 535.

² P. Z. S. 1864, p. 537.

³ P. Z. S. 1864, p. 534.

Probably the animal had just shed its winter coat, and the hair may have been worn. There is only a fragment of the skull left. *P. quadriscipus* of Hodgson is a well-striped form with long hair, having doubtless been killed in the cold season. There is no skull at all in this case. Both may be safely referred to *P. hermaphroditus*.

P. crassiceps of Pucheran is said to have been remarkable for the size of its head (no dimensions, however, are given) and the great development of the silvery-white mark on the forehead. The description is not sufficient for satisfactory determination. *P. fasciatus* has been already disposed of.

3. PARADOXURUS PHILIPPINENSIS.

? *Martis species*, Camelli, Phil. Trans. xxiv. p. 2204 (1706).

Paradoxurus philippinensis, Jourdan, Comptes Rendus, v. p. 523 (1837).

P. zeylanicus, Gray, List Sp. Mam. B. M. 1843, p. 55.

P. philippensis, F. Cuv. An. Sc. Nat. sér. 2, viii. p. 372 (1837); Temm. Mon. Mam. ii. p. 339; Wagner, Schreb. Säugeth. Supp. ii. p. 355; Schinz, Syn. Mam. i. p. 387; Giebel, Säugeth. p. 799; Gray, P. Z. S. 1864, p. 537; Cat. Carn. &c. Mam. B. M. 1869, p. 70.

Structure very similar to that of *P. niger* and *P. hermaphroditus*, but size rather smaller. Fur closer and softer, less ragged and more even in length, and the hairs having a peculiar gloss. Underfur thicker and more woolly. The upper sectorial has a very large inner lobe nearly in the middle of the tooth, the length of the outer margin being very little more than the breadth of the tooth at right angles to that margin.

Colour dusky brown above, brownish grey below, either no markings on the back or indistinct rows of spots. The underfur is dark grey or blackish; the longer hairs are light brown with black tips. Head mostly black or blackish brown, feet and tail the same. The pale band across the forehead and spots under the eye occur as in *P. hermaphroditus*, but less distinct.

Dimensions. No trustworthy measurements are available; the head and body appear to be about 18 inches long. Skull about 4.1.

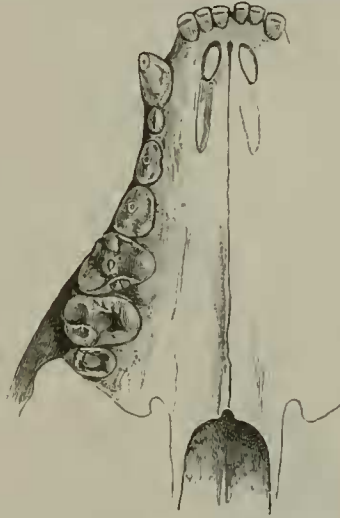
Distribution. The Philippine Islands. There are in the British-Museum collection two skins from Borneo, apparently belonging to this form, and, as already remarked, all Bornean specimens look somewhat intermediate between *P. hermaphroditus* and *P. philippinensis*.

If *P. niger* and *P. hermaphroditus* are classed as races of one species, *P. philippinensis* must, I think, be added as a third race; the differences are about the same in each case.

Synonymy. *Martes philippensis*, Camelli, is quoted by Schreber as a possible synonym of Pallas's *Viverra zeylonensis*, and the same reference has been quoted by Gmelin, Gray, and others. Camelli, who was probably a missionary, gave a Latin list, which was printed in the 'Philosophical Transactions,' of the quadrupeds inhabiting

the Philippine Islands, and in this list included a species of Marten. He used no such name as *Martes philippensis*, but his supposed Marten may have been the present *Paradoxurus*.

Fig. 3.



Half palate and dentition of *P. philippinensis*. (Spec. no. B.M. 42.2.15.242.)

Jourdan's description is very poor, but there is no reason to suppose that the species described by him was different. Temminck's description was taken from the Philippine specimens in the British Museum by Mr. Ogilby; but Temminck was mistaken in supposing that the *Ambliodon doré* of Jourdan was the same species.

4. PARADOXURUS MACRODUS.

Paradoxurus macrodus, Gray, P. Z. S. 1864, p. 538; Cat. Carn. &c. Mam. B. M. 1869, p. 70.

This species is only known by a skull preserved in the British-Museum collection. This skull was received from the Zoological Society many years ago, when the Society's museum became a part of the National Collection. Nothing is known of the locality or history of the specimen, and the skin has not been preserved.

The general form of the skull, which has been figured in the Society's 'Proceedings' and in the British-Museum Catalogue, differs in no respect from that of *P. hermaphroditus*, but the teeth are very much larger, the sectorial in both upper and lower jaw and the first true molar in the upper and fourth premolar in the lower especially. It is true that there is a gradual increase in size in these teeth from Indian or Ceylonese examples of *P. niger* to Bornean skulls of *P. hermaphroditus*, but the difference between the latter and *P. macrodus* is greater than that between the teeth of Ceylonese or Indian and of Bornean skulls.

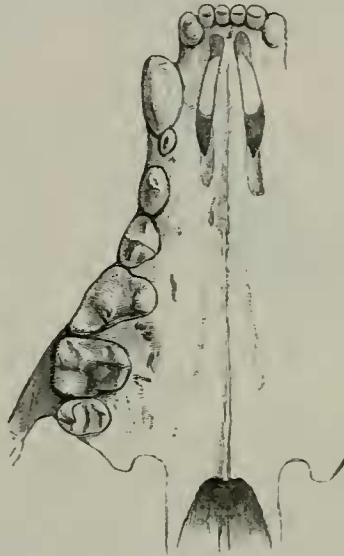
5. PARADOXURUS JERDONI. (Plate XLIX.)

Paradoxurus jerdoni, W. Blanf. above, p. 613.

For description see the reference.

This species is distinguished by its uniform rich dark brown colour, slightly grizzled, owing to a subterminal grey ring on the hairs, which are of equal length, not ragged. The tip of the tail

Fig. 4.



Half palate and dentition of *P. jerdoni*, from type.

is white in the only two specimens examined. Dimensions apparently similar to those of *P. niger*. Skull nearly $4\frac{1}{2}$ inches long. The dentition is very like that of *P. aureus*. The anterior palatine foramina are much longer than in any other species, and extend back to a line drawn through the hinder edges of the anterior premolars.

6. PARADOXURUS AUREUS. (Plate L.)

Paradoxurus aureus, F. Cuv. Mém. Mus. Hist. Nat. ix. p. 48, pl. iv. (1822); Desm. Mamm. Supp. p. 540; Gray, P. Z. S. 1832, p. 68.

Paradoxurus zeylanicus, Kelaart, Prod. Faun. Zeyl. p. 39 (1852); Blyth, J. A. S. B. xx. pp. 161, 184; Cat. Mam. Mus. A. S. p. 47; Gray, P. Z. S. 1864, p. 531; Cat. Carn. &c. Mam. B. M. 1869, p. 64 (nec Gray, List Sp. Mam. B. M. 1843, p. 55; nec *Viverra zeylonensis*, Pallas, Schreb. Säugeth. iii. p. 451; nec *V. zeylanica*, Gmel.).

P. montanus, Kelaart, *apud* Blyth, J. A. S. B. xx. pp. 161, 184; Kel. Prod. Faun. Zeyl. p. 40.

Tail about four fifths the length of the head and body. Fur moderately soft and thick, of uniform length, with but little woolly underfur.

Skull similar to that of *P. hermaphroditus*, and with the palate

not prolonged behind. Inner lobe of upper sectorial well developed. The anterior upper true molar broader inside than in the common species, being nearly rectangular.

Colour uniform dull rusty red or dull chestnut (as Blyth remarks, very like that of the Common European Weasel), passing, however, in some specimens (*P. montanus* or *P. zeylanicus*, var. *fuscus*, Kelaart) into a browner tint. The fur and underfur of nearly the same colour throughout; no black tips to the fur. Faint longitudinal dorsal streaks may be detected on many specimens. A white sub-terminal band on the tail has been observed. Vibrissæ whitish in dried skins, probably the same colour as the other hairs originally.

Dimensions. A fully grown female, according to Kelaart, measured, head and body 19 inches, tail 15·5, height 8. Skull 4·15 inches long.

Distribution. The island of Ceylon, apparently throughout, the darker variety being from a considerable elevation.

This species may at once be distinguished by its colour. The dentition differs considerably from that of *P. niger*, the only other kind found in Ceylon, and proves that the present is not a rufous variety of that species.

Synonymy. It has already been shown that this *Paradoxurus* cannot be identified with *Viverra zeylonensis*, the colour being very different. Gray's original *P. zeylanicus* was *P. philippinensis*, and Kelaart appears to have been the first to apply the term *P. zeylanicus* to the present kind. Although F. Cuvier's name *aureus* was given to a very young specimen, there is no other species known to which the description "*couleur d'un beau fauve doré uniformément répandu sur tout son corps*" can apply.

7. PARADOXURUS GRAYI.

Paradoxurus grayi, Bennett, P. Z. S. 1835, p. 118; Wagner, Schreb. Säugeth. Suppl. ii. p. 340 (1841); Horsfield, P. Z. S. 1856, p. 396; Blyth, Cat. Mam. Mus. A. S. p. 48; Cat. Mam. Birds Burma, p. 26; Jerdon, Mammals of India, p. 128; ? Ball, Stray Feathers, ii. p. 369.

P. nipalensis, Hodgson, As. Res. xix. p. 76 (1836); J. A. S. B. x. p. 909, xi. p. 279; Calc. Jour. Nat. Hist. iv. p. 287; Wagner, Schreb. Säugeth. Suppl. ii. p. 341; Schinz, Syn. Mam. i. p. 387.

Paguma grayii, Gray, List Sp. Mam. B. M. 1843, p. 54; Cat. Hodgs. Coll. B. M. 1846, p. 9; 2nd ed. 1863, p. 5; Horsf. Cat. Mam. Mus. E. I. C. p. 66; Gray, P. Z. S. 1864, p. 541; Cat. Carn. Mam. B. M. 1869, p. 73.

Paradoxurus tytleri, Tytler, J. A. S. B. xxxiii. p. 188 (1864).

Larger than *P. hermaphroditus*. Tail about the same length as the head and body. Fur varying in length but uniform, not ragged; woolly underfur frequently well developed.

In the skull the constriction behind the postorbital process is less than in the preceding species, and the forehead between the orbits more rounded. The bony palate runs back above the posterior nares for 0·4 to 0·5 inch behind a line drawn through the hinder edge of the posterior molars, and is deeply concave at the end. Teeth smaller

than in the preceding species; the inner lobe of the upper sectorial small, and the anterior upper true molar nearly triangular

Colour grey throughout, without markings on the body, the lower

Fig. 5.



Half palate and dentition of *P. grayi*. (Spec. no. B.M. 151 b.)

parts paler and whitish. Underfur brownish grey or dusky, paler towards the base, longer hairs whitish grey towards the end, the tips on the upper parts black. Frequently, though not always, the terminal half of the tail is dusky or blackish; feet usually brown. Head, including ears and chin, brown or blackish, with the exception of the forehead, a broad band beneath each ear, a narrower line down the nose, and a blotch or spot below each eye, where white hairs are conspicuously intermixed, but there is some variation in their proportion and distribution, and the markings are not distinct. Vibrissæ mostly white, some of the uppermost black.

Some specimens in the British Museum have a yellowish or brownish tinge, especially on the rump, thighs, and base of the tail.

Dimensions. Head and body 24 to 25 inches, tail with hair at the end about the same; weight 9 to 10 lb. (*Hodgson*). Skull 4·6 inches long.

Distribution. The Himalayas as far west as Simla; Assam, Arakan, and the Andaman Islands. Ball records it from Chutia Nagpur in South-west Bengal; and McMaster in his Notes on Jerdon, p. 37, suggests its occurrence in the Northern Circars, in the extreme north-east corner of the Madras Presidency; but both these observations require confirmation.